

Moles, Stoichiometry, and Calculations Quiz

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1. A mole can be defined as:
 - a) a type of rodent
 - b) 6.02×10^{23} entities
 - c) an undercover agent
 - d) all of the above
 - e) none of the above
2. The mole was first described as the number of particles in:
 - a) 1.0 g of Hydrogen
 - b) 4.0 g of Helium-3
 - c) 12.0 g of Carbon-12
 - d) 16.0 g of Oxygen-16
 - e) the universe
3. If the atomic mass of one CO_2 molecule is 44.01 amu, then the mass of one mole of CO_2 is:
 - a) 44.01 lb
 - b) 44.01 g
 - c) 44.01 kg
 - d) 44.01 t
 - e) variable
4. How many moles of LiF would you have if you had a 10.0 g sample and the molar mass of LiF is 25.9 g/mol? ($n = m/M$)
 - a) 0.386 mol
 - b) 3.86 mol
 - c) 2.59 mol
 - d) 259 mol
 - e) none of the above
5. You are trying to figure out how much of a chemical to use in a reaction. You know that you need 2 moles of this chemical and that its molar mass is 58.44 g/mol. How much of the chemical do you need? (use equation in previous question)
 - a) 29.22 g
 - b) 116.88 g
 - c) 0.034 g
 - d) 11.688 g
 - e) can't calculate
6. The fact that hydrochloric acid (HCl) has the same composition anywhere in the world is also known as:
 - a) Murphy's Law
 - b) the Rule of Thumb
 - c) the Law of Definite Proportions
 - d) the Theory of Constant Composition
 - e) a random fact
7. If you were combining two reactants ("A" and "B") and found that after the reaction finished (producing "AB") you had some of the B reactant left over:
 - a) Reactant B would be the limiting reagent
 - b) Reactant B would be the excess reagent
 - c) Reactant A would be the excess reagent
 - d) Product AB would be the limiting reagent
 - e) none of the above

8. You are expecting to get only 8.0 g of CaCO_3 from a reaction, but you get 9.0 g! What is the percent yield? (% yield = actual yield/theoretical yield x 100%)
- a) 88.9% c) 1.125%
b) 0.889% d) 112.5%
9. When using a Mass Spectrometer, you expect:
- a) heavier samples to divert less from their path
b) heavier samples to divert more than lighter samples
c) lighter samples to divert more from their path
d) a and c
e) none of the above
10. You have just discovered a new compound. Based on lab results, its empirical formula is $\text{C}_3\text{H}_4\text{O}_3$. After running a sample of your compound through a mass spectrometer, you get a molar mass of 264.17 g. The actual molecular formula is: (C = 12.01 amu; H = 1.007 amu; O = 16.00 amu; Hint = Calculate **M** and compare...)
- a) $\text{C}_3\text{H}_4\text{O}_3$
b) $\text{C}_6\text{H}_8\text{O}_6$
c) $\text{C}_9\text{H}_{12}\text{O}_9$
d) $\text{C}_{12}\text{H}_{16}\text{O}_{12}$
11. How many grams of calcium chloride do you need to fully react with 10.0 g of sodium phosphate? [4 marks] Note that Steps 1 and 2 and part of Step 3 have been completed for you....
(Na = 22.99 amu; P = 30.97 amu; O = 16.00 amu; Ca = 40.08 amu; Cl = 35.45 amu)

Chemical Equation	2 Na_3PO_4	+ 3 $\text{CaCl}_2 \rightarrow$	6 NaCl + $\text{Ca}_3(\text{PO}_4)_2$
¹ Mole ratio	2	to 3	-
Mass (g) $m = n \times M$	2 10.0 g	6	-
Molar mass (g/mol) M	3 = (6 x 22.99) + (2 x 30.97) + (8 x 16.00) =	3	-
Moles (mol) $n = \frac{m}{M}$	4	5 Mole ratio is 2:3, so multiply Step 4 answer by 3/2 =	-

12. Balance the following chemical equation: [1 mark]

